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Difference of late potentials detected by signal-averaged ECG in patients with spontaneous or drug-induced type 1 electrocardiogram pattern of Brugada syndrome

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Introduction: Brugada syndrome (BrS) patients (pts) with spontaneous type 1 electrocardiographic (ECG) pattern (sT1ECGp) have a greater arrhythmic risk compared to those with fleicainide-induced type 1 ECG pattern (iT1ECGp). However, when the analysis is restricted to asymptomatic pts, the type 1 spontaneous pattern loses its independent prognostic value. Late potentials (LP) obtained by signal-averaged ECG (SA-ECG) are associated with regions of delayed myocardial depolarization and consequent abnormal electrical conduction. There is a higher prevalence of LP obtained by SA-ECG in pts with BrS and their detection showed a strong prognostic predictor value in several studies.

Objective: To evaluate the presence of LP by SA-ECG in pts with BrS and assess differences between patients with spontaneous or drug-induced type 1 ECG pattern.

Methods: This was a single-center prospective study of consecutive pts diagnosed with BrS, including sT1ECGp and iT1ECGp. The patients were submitted to SA-ECG study to detect LP, with determination of the duration of filtered QRS (fQRS), root-mean-square voltage of the terminal 40ms of the filtered QRS (RMS40) and the duration of low-amplitude signal ($<40\ \mu V$) in the terminal part of the filtered QRS complex (LAS40), using conventional and right modified leads. The presence of LP was considered positive when ≥ 2 of the following were present: fQRS ≥ 114 ms, RMS40 $<20\ \mu V$ or LAS40 ≥ 38ms. The results were displayed using medians and interquartile ranges, obtained using the Mann-Whitney test.

Results: The presence of LP by SA-ECG was studied in 29 pts (75.9% male, mean age 44±12 years), 18 with sT1ECGp and 11 iT1ECGp. Only 3 pts (10.3%) had symptoms related with BrS (unexplained syncope) and none had documented malignant ventricular arrhythmias. Known or potential pathogenic mutations were identified in 5 pts (17.2%). The presence or absence of LP showed no statistically significant difference according to clinical, electrocardiographic or genetic characteristics of the pts. However, in conventional leads, pts with sT1ECGp showed significantly higher values of fQRS and lower values of RMS40 [fQRS 108 (103–112) vs. 97 (89–103), p=0.016; RMS40 19 (10–22) vs. 22 (16–40), p=0.028]. In addition, in modified right leads, pts with sT1ECGp had significantly higher values of fQRS, lower RMS40 and longer LAS40 [fQRS 108 (101 -111) vs. 98 (89–102), p=0.0005; RMS40 15 (11–21) vs. 25 (18–33), p=0.007; LAS40 41 (34–49) vs. 31 (28- 39), p=0.007].

Conclusion: Patients with the spontaneous type 1 electrocardiographic (ECG) pattern revealed a higher detection of late potentials, which may partially explain the higher arrhythmogenic risk classically described in this subgroup of BrS patients.